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Case Report

The white cerebellum sign: Classic but under recognized sign of brain injury ☆

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ABSTRACT

The white cerebellum sign is a concerning but uncommon radiological imaging result that is frequently seen in patients with severe, frequently irreversible anoxic-ischemic brain injury. Due to its frequent correlation with an unfavorable prognosis, radiologists must recognize this sign. We report the case of a 1 year old girl with history of epilepsy who presented with deterioration of conscious level and focal fits and brain computed tomography scan done on her revealed the white cerebellum sign.

Introduction

The white cerebellum sign is a well-known but rare radiological abnormality that is typically seen in pediatric patients and can have many different explanations. Also referred as the dense cerebellum sign or the inversion sign, it frequently indicates serious, irreversible anoxic-ischemic brain injury with a bad prognosis.

It indicates diffuse decrease in the density of the supratentorial brain parenchyma, with relatively increased attenuation of the thalami, brainstem, and cerebellum. The white cerebellum sign has drawn the attention of scientists over the years but rarely documented in the literature [1,2].

Case report

We report a 1-year-old female patient with a history of epilepsy (complex partial seizures type), who was on anti-seizure medication (carbamazepine). He presented with deterioration of consciousness level and focal fits one day before presentation. The patient had complex partial seizures that included recurrent focal fits of right side of the body for 30 minutes duration associated with decreased consciousness level. There was no history of up-rolling of eyes, urinary or fecal incontinence and frothing from mouth.

At presentation, the patient had a Glasgow scale of 9/15, pupils were fixed and dilated. Her complete blood picture,

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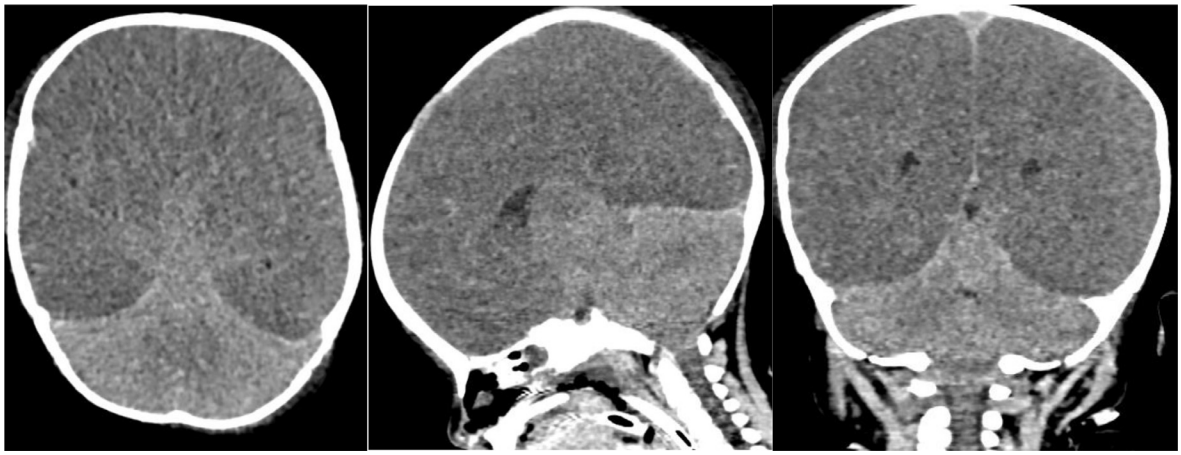

Fig. 1 – Axial, sagittal and coronal CT images showing the white cerebellum sign.

liver function tests, renal function tests, serum electrolytes, calcium, magnesium, phosphate, albumin, C-reactive protein and urine routine examination were within normal limits.

A brain CT scan without contrast was performed which showed a diffuse decrease in density of the supratentorial brain with relatively increased attenuation of the thalami, brainstem, and cerebellum giving the "white cerebellum sign". There is also obliteration of the surface and central CSF spaces as well as loss of the gray white matter interface in keeping with severe edema (Fig. 1). The diagnosis of white cerebellum sign caused by status epilepticus was made, and patient was managed accordingly. Unfortunately, the patient passed away five days later due to respiratory pneumonia in the intensive care unit.

Discussion

Another term for the white cerebellum sign is dense cerebellum sign [3]. It typically indicates severe, permanent anoxic neuronal injury that causes widespread cerebral ischemia [3]. The white cerebellum sign is an uncommon neuroimaging finding [4]. Usually observed in children with severe hypoxic brain injury, it has also been described in patients with severe head trauma, status epilepticus, drowning, meningoencephalitis, neonatal asphyxia, smoke inhalation, hypothermia, postpartum, Wernicke's encephalopathy, and other causes of global hypoperfusion, and is rare in adults compared to children [2].

The exact mechanism and pathogenesis remain unclear and is not fully understood. Various and several hypothesis has been put, some of them includes distention of deep medullary veins due to partial obstruction by raised intracranial pressure resulting in cerebral edema [5].

The specific appearance of this sign on CT and MRI brain scans is caused by a diffuse oedema that results in a generalized hypodensity of the cerebral hemisphere and a loss of gray-white matter distinction, while the cerebellum appears hyperdense and maintains its normal density [3]. Additional indicators of diffuse cerebral edema include the erasure of basal cisterns, particularly the peri-mesencephalic cisterns, bilateral compression of the lateral ventricles, and the lack of cortical grooves [6].

Magnetic resonance imaging (MRI), when combined with the diffusion technique or with proton spectroscopy, and measurement of apparent diffusion coefficient, becomes the most sensitive modality for the early diagnosis of cerebral hypoxia. Within the first 12 and 24 hours following a hypoxic or ischemic event, it frequently exhibits a hypersignal diffusion [6]

The white cerebellum sign is linked to diffuse atrophy development, cystic encephalomalacia, significant irreversible brain injury, and a bad prognosis. When this sign appears on a CT scan, one-third of the patients eventually pass away [7].

Conclusion

The white cerebellar sign is a subtle but well-known radiological imaging finding that indicates an almost fatal permanent brain damage. In order to handle, monitor, and counsel these patients, radiologists and clinicians must be aware of it.

Patient consent

Written informed consent for the publication of this case report was obtained from the parent of the patient.

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